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PROJECT SPECIFIC PLAN FOR CONDUCTING DIRECT-PUSH SAMPLING IN THE SOUTH PLUME

Project Number 52421-PSP-0001

Revision 0, Final

Prepared by

Fluor Fernald

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1.0 INTRODUCTION

irect-push groundwater sampling in the Great Miami Aquifer will be conducted in the off-property ɔrtion of the South Plume (south of Willey Road). The purpose of the sampling is to support the e-design effort for Phase II of the South Plume Optimization Module. The pre-design sampling will elp determine the need for additional extraction wells in the off-property area of the South Plume.

ifteen direct-push sampling locations are proposed (13226 through 13240) south of Willey Road, but ɔrth of two existing Phase I South Plume Optimization Module Extraction Wells 32308 and 32309. gure 1 shows the 15 locations. Re-injection has been conducted just north of Willey Road since ptember of 1998. Uranium concentration reduction within the total uranium plume immediately south the re-injection wells has already been documented through previous rounds of direct-push sampling. hat is not known is the pattern and extent of the total uranium concentration reductions. The objective this more extensive round of direct-push sampling is to characterize the lateral and vertical extent of e remaining total uranium plume located between Willey Road and Extraction Wells 32308 and 32309. ata will be used to make operational decisions concerning the re-injection wells, Extraction Wells 2308 and 32309, and for deciding whether or not an additional extraction well is needed in the area. dditional direct-push sampling locations may be located and sampled pending the data received from e locations shown in Figure 1. If the need for an additional location is identified, then it will be iiquely numbered, surveyed, and then sampled as outlined in this Project Specific Plan (PSP).

ıe 15 direct-push sampling locations identified in this PSP are located on private property. Final rmission to probe, schedule of the probing, and exact locations are pending landowner approval. Most the 15 locations are situated in a field used by the landowner to grow crops. The landowner has pressed that he would like to limit the number of locations in this field to as few as possible. To mply with this request a sampling pattern was established so that sampling at six of the locations will pend upon results obtained from the first nine locations (13226 – 13234). Six of the first nine cations (13226, 13227, 13228, 13232, 13233, and 13234) are located along the edge of the study area, ith three along the north edge and three along the south edge. The other three of the first nine locations 3229 - 13231) are located midway between the north and south edge, in the middle of the field. If ese nine locations provide enough data to make a sufficient plume interpretation across the field, then mpling at the remaining six locations (13235 – 13240), which are all located in the field, will not be cessary.

2.0 MANAGEMENT AND ORGANIZATION

The U.S. Department of Energy (DOE) Operable Unit 5 Team Leader is responsible for:

- Acting as the point of contact within DOE and for the regulators and stakeholders for all communications concerning work carried out under this PSP.

The Aquifer Restoration/Wastewater Project (ARWWP) Manager is responsible for:

- Providing overall project management and technical guidance
- Ensuring the necessary resources are allocated to the project for the efficient and safe co of PSP activities
- Overseeing and auditing PSP activities to ensure that the work is being performed efficie in accordance with all regulatory requirements and commitments, DOE Orders, site polic procedures, and safe working practices.

The ARWWP Hydrogeology Team Coach/Project Lead is responsible for:

- The safe and prompt completion of work as outlined in the PSP
- Oversight and programmatic direction of sampling activities
- Providing a technical lead for the collection and interpretation of sampling data
- Establishing and maintaining the scope, schedule, and cost baseline
- Reporting to the DOE Operable Unit 5 Team Leader and ARWWP Manager on the statu activities and on the identification of any problems encountered in the accomplishment o PSP
- Obtaining the necessary funding to complete the sampling and data analysis activities.

The ARWWP Hydrogeology Technical Lead is responsible for:

- Reporting to the ARWWP Hydrogeology Project Lead on the progress of PSP activities a the identification of any problems encountered in the accomplishment of the PSP
- Providing technical guidance and assisting field personnel as required to complete work described in this PSP
- Interpretation of data collected in the field.

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The Environmental Monitoring (EM)/Soils and Miscellaneous Projects Team Coach is responsible for:

- Managing and conducting direct-push sampling activities
- Safety walk downs of the work areas, ensuring personnel are trained to safety and technical requirements, procuring applicable work permits, and ensuring that safety and PSP requirements are being adhered to during field implementation
- Reporting field progress to the ARWWP Hydrogeology Project and Technical Leads
- Complying with any agreed to landowner requests concerning access to direct-push sampling locations on private property.

Project Specific Plan personnel contacts are listed below:

KEY PROJECT PERSONNEL

Title	Primary	Secondary
DOE Operable Unit 5 Team Leader	Rob Janke	
ARWWP Manager	Dave Brettschneider	
ARWWP Hydrogeology Team Coach/Project Lead	Bill Hertel	Ken Broberg
ARWWP Hydrogeology Technical Lead	Ken Broberg	Bill Hertel
EM Soil and Miscellaneous Media Projects' Team Coach	Tom Buhrlage	Jim Hey
Field Oversight Contact	Jim Hey	Tom Buhrlage
Laboratory Contact	Brenda Collier	
Environmental Compliance Contact	Frank Johnston	
Quality Control Contact	Scott Wheeler	Frank Thompson

3.0 DIRECT-PUSH SAMPLING

Analysis of groundwater samples obtained with a direct-push sampling tool will be used to refine tl horizontal extent and determine the vertical extent of the remaining 30 micrograms per liter (µg/L) uranium plume at select locations. The direct-push sampling tool will be used to collect groundwat samples from different vertical depths within the aquifer, rather than at a fixed monitoring depth.

At each direct-push sampling location, groundwater samples will be collected at the following dept below the water table: 1 foot, 10 feet, and at subsequent depth intervals of 10 feet until it can be ve that the entire vertical thickness of the 30 µg/L total uranium plume has been sampled. Groundwat samples will be filtered using a five-micron filter and analyzed for total uranium.

3.1 SURVEYING AND STAKING DIRECT-PUSH SAMPLING LOCATIONS

The ground elevation and location of each direct-push sampling location will be surveyed. A surve stake will be driven into the ground at each location and labeled. Prior to penetrating the ground su field crews shall conform to the requirements stated in procedure SH-0018, *Penetration Permits*. T corresponding sampling location number for the sampling location will be written on the survey sta unique number will identify each sampling location.

3.2 DIRECT PUSH REQUIREMENTS

Field crews shall conform to the requirements stated in procedure SH-0018, *Penetration Permits*, p penetrating the ground surface. Collection of groundwater samples using a direct push-sampling to described in Data Quality Objective GW-030.

A Geoprobe™ mill-slotted sampler will be used to collect groundwater samples using direct push techniques as outlined in procedure EQT-06, *Geoprobe™ Model 5400 Operation and Maintenance* slot size of the sampler will be 0.02 inches and the length of the slotted section will be 2 feet. The v point will be advanced with a 1.50-inch outside diameter probe rod. A 1.25-inch outside diameter p rod may be used on shallow holes with written permission (i.e., email) from the ARWWP Hydroge Team Coach/Project Lead or Technical Lead. Samples will be collected through 3/8 or 1/2-inch ou diameter polyethylene tubing equipped with a foot valve (ball check valve). New tubing will be us each sampling depth for sample collection. The middle of the mill-slotted screen in the push rods w positioned at the desired sampling depth.

For planning purposes, Table 3-1 provides the estimated ground surface elevations and depths to water for the 15 direct-push sampling locations. Table 3-2 is a copy of a Geoprobe™ Aquifer Sampling Depth Form. A unique Geoprobe™ Aquifer Sampling Depth Form will be prepared for each direct-push sampling event as discussed below:

- The location number will identify the direct-push sampling location on the Geoprobe™ Aquifer Sampling Depth Form.

- The surveyed surface elevation of the direct-push hole (refer to Section 3.1) will be recorded on the Geoprobe™ Aquifer Sampling Depth Form.

- The depth to water will be measured using a water level indicator to the nearest 0.1 foot. The depth to water will be recorded on the Geoprobe™ Aquifer Sampling Depth Form.

- A groundwater sample will be collected from a depth of 1 foot below the water table. If water is not collectible at 1 foot below the water table, then the sampling screen will be positioned 2 or 3 feet below the water table for the first sample depth.

- The sampler rods will be advanced to a depth that will position the middle of the sampling screen at the required sampling depth of 10 feet below the water table. The depth to water will be re-measured using a water level indicator. Past experience with direct-push sampling at the site has shown that sometimes the water table within the direct-push hole has not totally stabilized when the first sample is collected (1 foot below the water table), but will have stabilized by the time the second sample is collected. The second water level will be recorded on the Geoprobe™ Aquifer Sampling Depth Form.

  Note: The sample at 10 feet below the water table may be collected first if there is a need to remove clay from the mill-slots of the sampler rod (refer to the procedure outlined below).

- Using the water level measured when the sampling tool is at a depth of 10 feet below the water table, the sampling depth for the rest of the samples (e.g., 20 feet, 30 feet, 40 feet, 50 feet, 60 feet, 70 feet, 80 feet, and 90 feet below the water table) will be recorded on the Geoprobe™ Aquifer Sampling Depth Form.

- The next step is to proceed with collecting groundwater samples at the rest of the sampling depths by positioning the middle of the sampling screen at the required sampling depths. If clay should enter the sampler rods, then the clay should be removed through the addition of water into the sampler rods above the clay as well as advancing the rods 10 feet below the water table to loosen the compacted clay in the rods. The procedure that will be followed is outlined below:

  - Using polyethylene tubing, push the tubing into the rods and attempt to force the clay up into the tubing.

  - Add up to 1 liter of deionized water to the probe rods in 250-ml increments with surging following each addition. The surging should be performed with polyethylene tubing with a ball check valve installed. The surging will convert the clay into a slurry that can be pumped to the surface by oscillating the tubing.

- In addition to the standard purge volume for 10 feet below the water table (0.6 liters), five t the volume of water added to the sampler rods will be collected prior to collecting the 10 fe below the water table sample.

- Following collection of the 10 feet below the water table sample, the sampler rods will be r to 1 foot below the water table depth for sample collection. A total of 1 liter of water shoul purged from 1 foot below the water table prior to sample collection to ensure a representati sample is collected.

Water sampling will continue at depth increments of 10 feet until the lower limit of the 30 µg/L tot uranium plume has been located, or as directed by the ARWWP Hydrogeology Technical Lead. If obstructions are encountered or equipment complications prevent the sampler rods from extending desired depths, then a different method for obtaining the sample may need to be used. The ARWW Hydrogeology Project Lead and/or the ARWWP Hydrogeology Technical Lead will approve any alternate methods.

3.3 GROUNDWATER SAMPLE COLLECTION

One rod volume of groundwater will be purged at each sampling depth prior to collecting groundwa samples. The sampler rods will be purged from near the top of the water column or as close to the t (within 10 feet) to ensure representative samples are collected. Groundwater samples will be collec from as close to the screened interval as possible, taking care to avoid any clogging within the samp tube due to accumulated silt/sand that has entered the mill slots. The same polyethylene tubing use collect the groundwater sample from a particular interval or a dedicated purge tube will be used to p the next sample interval. Purge volumes are based on the sample's depth below the water table. Estimated purge volumes are provided on the Geoprobe™ Aquifer Sampling Depth Form.

All samples will be filtered through a five-micron in-line filter attached to the discharge end of a peristaltic pump. These samples will be listed as 5 micron filtered on the Chain-of-Custody (COC)

Groundwater samples collected using a direct-push tool are turbid and require filtering. The objecti with filtering has been to collect a sample that undergoes the least amount of filtering but will still y a representative sample. In past direct-push projects, both 5-micron filtered and 0.45-micron filtere samples were collected and analyzed for total uranium. The 5-micron filtered samples were identif as "unfiltered" on the COC, and the 0.45-filtered samples were identified as "filtered" on the COC. Analytical results have been consistently similar regardless of whether or not the filter was 5-micro 0.45-micron. The 5-micron filtered sample results were therefore used, and will continue to be use plume interpretations.

Because past experience has shown that the extra filtering, above and beyond the 5-micron filtering, is not required, 0.45-micron filtered samples will no longer be routinely collected. If turbidity problems are ever encountered with the 5-micron filtered samples, then 0.45 micron filtered samples may also be collected again, but this would be on a case-by-case specific basis only.

Table 3-3 lists the preservation requirement, holding time, optimum/minimum sample volumes, and container type that will be used to collect the water sample. Estimated preservative volumes are listed for both optimum and minimum volumes. Minimal preservative volumes should be used to obtain a pH of <2 in order to prevent dissolution of solids in the sample. If more than 1.5 times the amount of nitric acid specified in Table 3-3 is required for lowering the pH to <2, then the ARWWP Hydrogeology Technical Lead will be contacted for direction. Analyses will be at Analytical Support Level (ASL) B and samples will be analyzed at the on-site Uranium and Thorium Analysis (UTA) Laboratory.

Table 3-4 lists the required quality assurance/quality control samples to be collected. One rinsate sample for total uranium analysis shall be collected prior to the start of each direct-push sampling location by rinsing a clean mill-slotted sampler rod. A duplicate sample will be collected at each location at a depth of 20 feet below the water table. This depth was selected as it is expected to be located within the total uranium plume.

3.4 PLUGGING OF DIRECT-PUSH SAMPLING HOLES

The sampler rods used for groundwater sampling will be completely removed from the borehole and the aquifer material will be allowed to collapse naturally up to the water table. Each direct-push sampling hole will be plugged with a sand interval followed by a bentonite slurry to the ground surface. The aquifer material will be allowed to collapse naturally up to the water table. After driving the rods to a depth of 3 feet above the water table, a 3-foot thick interval of clean silica sand will be placed into the base of the borehole above the water table. Bentonite slurry will be mixed to Sitewide Comprehensive Environmental Response, Compensation, and Liability Act Quality Assurance Project Plan (SCQ) specifications (approximately 9.4 pounds per gallon) and pumped through the rods to the bottom of the rods as the rods are removed. Plugging the hole with bentonite slurry will begin 3 feet above the sand and continue to the ground surface. Procedure EQT-06, *Geoprobe™ Model 5400 Operation and Maintenance*, will be followed for grout pump assembly and preparation of the grout mixture. For the grout pumping method, the procedure outlined in *Geoprobe™ Owner's Manual - GS-1000 Grout Machine/Operating Instructions* (Section C- Secondary Tool String-Grout Pull Cap) will be followed.

The volume of bentonite slurry used in the plugging process will be monitored and recorded on a Borehole Abandonment Record. The direct-push sampling hole will be inspected two to three days following grouting and, if necessary, bentonite pellets will be placed into the hole up to the ground surface. In this event, the Borehole Abandonment Record will be revised with the additional volum information.

Grout volumes have been estimated for each direct-push sampling location using preliminary survey elevations, depth to water elevations, and the following formula (volume [gallons] = depth to water in feet multiplied by 0.13) assuming 1.50-inch rods are used and the final direct-push sampling hole diameter is roughly 2.0 inches. It will be necessary to re-calculate these volumes if the depth to wat significantly different than what is estimated in Table 3-1. The volume estimates for each direct-pu sampling location are as follows:

Location	Grout Volumes	Location	Grout Volumes
13226	8.3 gallons	13234	7.9 gallons
13227	8.3 gallons	13235	1.7 gallons
13228	6.2 gallons	13236	7.3 gallons
13229	7.2 gallons	13237	7.3 gallons
13230	7.3 gallons	13238	1.6 gallons
13231	7.7 gallons	13239	7.2 gallons
13232	7.7 gallons	13240	7.7 gallons
13233	7.7 gallons		

3.5 SAMPLE IDENTIFICATION

All groundwater samples collected for laboratory analysis will be assigned a unique sample identific number, also known as a Fernald Analytical Computerized Tracking System (FACTS) identification number. The FACTS number will identify the direct-push sampling location and depth (feet below water table) at which the sample was collected. For example, the sample identifier for a sample coll at location 13226 at a depth of 1 foot below the water table would be "13226-01." The sample ident for a duplicate sample collected at a depth of 20 feet below the water table would be "13226-20-D."

A rinsate from each direct-push sampling location will be collected and identified using the location number and letter "X." The "X" designates it as a rinsate sample. For example, the sample identifie a rinsate sample collected at location 13226 would be "13226-X." Duplicate samples will be collect each direct-push sampling location from the depth of 20 feet below the water table. The duplicate samples will be analyzed for total uranium.

4.0 EQUIPMENT DECONTAMINATION

Probe rods and sampling equipment will be decontaminated to at least Level I prior to initiating probing at the first location and between direct-push sampling locations using a high-pressure spray wash as per procedure SMPL-02.

5.0 DISPOSITION OF WASTES

Any contact wastes generated during field activities will be managed per Project Waste Identificati document number 552. The Waste Acceptance Organization will be contacted for specific directio waste-stream by waste-stream basis. Any small amount of groundwater and/or decontamination wa generated will be managed according to the Wastewater Discharge Request Form FS-F-4045.

6.0 HEALTH & SAFETY

ersonnel shall conform to precautionary surveys performed by the personnel representing the Utility ngineer, Safety and Health, and Radiological Control. Concurrence to applicable safety permits ndicated by the signature of personnel assigned to this project) is expected from all project personnel in ıe performance of their assigned duties. The EM Team Coach will ensure that all EM personnel erforming project-related activities have read or been trained to the EM sampling procedures applicable) this work. In addition to the applicable surveys that protect worker safety and health is an cknowledgment of understanding the Project Specific Plan requirements and safety precautions outlined ı the procedures and permits. A copy of applicable safety permits/surveys issued for worker safety and ealth shall be available for reference/review at each direct-push sampling location, and at the ɔmpletion of the project, the completed forms shall be submitted for incorporation into the project files.

7.0 QUALITY ASSURANCE/QUALITY CONTROL REQUIREMENTS

7.1 PROJECT REQUIREMENTS FOR SELF-ASSESSMENTS, SURVEILLANCES

Self-assessment of work processes and operations may be undertaken to assure quality of performa Self-assessment may be performed by the EM/Soils and Miscellaneous Media Projects Team Coacl will encompass technical and procedural requirements. Such self-assessments may be conducted a point in the project.

Independent assessment may be performed by the Fluor Fernald Quality Assurance organization by conducting surveillances. At a minimum the surveillance will consist of monitoring/observing ong project activities and work areas to verify conformance to specified requirements. Surveillances sh planned and documented in accordance with Section 12.3 of the SCQ.

7.2 VARIANCES TO THE PROJECT SPECIFIC PLAN

Variances shall be performed and documented in accordance with the requirements of Section 15.3 SCQ. They shall be documented on the Variance/Field Change Notice (V/FCN) Form, FD-F-4162. the variance is time-critical, then the requirements of Section 15.3.1 shall be followed, which allow approval of the variance by hard copy, electronic mail, or fax with the original V/FCN to follow an completed within five working days. Verbal approval is not allowed for variances; some form of documentation is required as stated in Section 15.3.1 of the SCQ. However, a location movement than 10 feet will not require a variance.

8.0 DATA MANAGEMENT

A data management process will be implemented so information collected during the direct-push sampling activity will be properly managed following completion of the field activities. As specified in Section 5.1 of the SCQ, sampling teams will describe daily activities on the Field Activity Log with sufficient detail so that the sampling team can reconstruct a particular situation without reliance on memory. Sample Collection Logs will be completed according to instructions specified in Section 6.1 of the SCQ.

All field measurements, observations, and sample collection information will be recorded as required and applicable on the Sample Collection Log, the Field Activity Log, and the Chain of Custody/Request for Analysis Form, the Borehole Abandonment Record, and the Geoprobe™ Aquifer Sampling Depth Form. The method of sample collection will be specified in the Field Activity Log. A unique sample identification number will appear on the Chain of Custody/Request for Analysis and will be used to identify the sample during analysis, data entry, and data management.

Technicians will review all field data for completeness and accuracy and then forward the data package to the Sample and Data Management organization for final review. The field data package will be filed in the EM's project records.

The Sample and Data Management organization will perform data entry into the Sitewide Environmental Database. Field logs will be maintained in loose-leaf form during the field recording activities. Analytical data will be reviewed by the ARWWP Hydrogeology Project Lead prior to entry or transfer of the data into the Sitewide Environmental Database from FACTS.

TABLE 3-1

ESTIMATED SURFACE ELEVATIONS AND ESTIMATED DEPTH TO WATER TAB FOR EACH DIRECT-PUSH SAMPLING LOCATION

Sampling Location	Estimated Ground Surface Elevations (feet above mean sea level)	Estimated Depth to Wate (feet below ground surfac
13226	580	64
13227	580	64
13228	568	48
13229	535	13
13230	576	56
12231	580	59
12232	580	59
12233	580	59
12234	581	61
13235	535	13
13236	576	56
13237	576	56
13238	533	12
13239	575	55
13240	580	59

TABLE 3-2

GEOPROBE™ AQUIFER SAMPLING DEPTH FORM

Location	Surface Elevation	Depth to Water, First Measurement in Feet	Depth to Water, Second Measurement in Feet
	amsl[a]	bgs[a]	bgs[a]

	Target Sampling Depth (feet below the water table [bwt])									
	1' bwt[b]	10' bwt	20' bwt	30' bwt	40' bwt	50' bwt	60' bwt	70' bwt	80' bwt	90' bwt
	Actual Sampling Depth (feet bgs[a])									
	bgs[a]	bgs[a]	bgs[a]	bgs[a]	bgs[a]	bgs[a]	bgs[a]	bgs[a]	bgs[a]	bgs[a]
Minimum Purge Volume (liters) for 1.25-inch or 1.50-inch Probe Rods[c,d]	0.1	0.6	1.2	1.8	2.4	3.0	3.6	4.2	4.8	5.4

[a]amsl = above mean sea level
bgs = below ground surface
[b]Additional purge volume may be required if sample intervals were collected out of sequence or water was added to the probe rods (refer to Section 3.2).
[c]Inside diameter for 1.25-inch outside diameter casing and 1.50-inch outside diameter casing is the same.
[d]Purge volume numbers taken from Geoprobe Systems "Yellow Field Book", 2000, page 15 of Casing Sizes and Well Volumes section.

TABLE 3-3

GEOPROBE™ SAMPLING ANALYTICAL REQUIREMENTS (ASL B)

Constituent	Laboratory[a]	Chemical Preservative[b]	Holding Time	Optimum Volume	Minimum Volume	Container Required	Approxin Detecti Level
Total Uranium	On-Site UTA	HNO_3, pH<2 2 drops/1 drop	6 months	50 ml	20 ml	120 ml plastic	1 µg/L

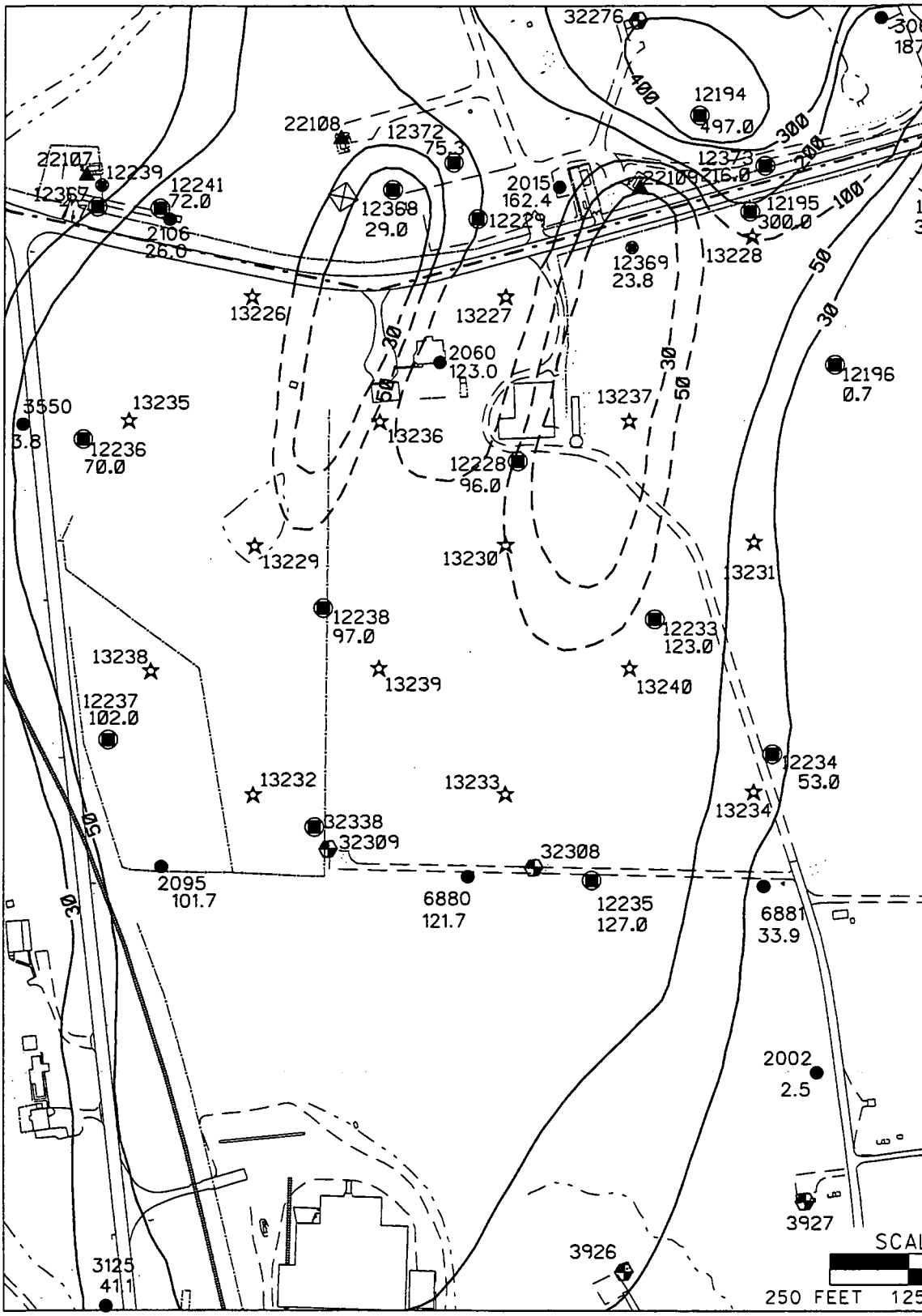
[a]All samples to be analyzed at ASL B as per SCQ specifications and audit requirements.
[b]Estimated preservative volumes listed are for optimum and minimum sample volumes. HNO_3 is 70 percent, Refer to Table 1 in procedure SMPL-02 for other volume information on the HNO_3 preservatives. Each drop acid contains approximately 0.05 ml.

TABLE 3-4

QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) SAMPLES, ANALYTICAL REQUIREMENTS

QA/QC Sample	Constituent	Laboratory	Chemical Preservative[a]	Holding Time	Optimum Volume	Minimum Volume	Container Required
Rinsate[b]	Total Uranium	UTA	HNO_3, pH<2 2 drops/1 drop	6 month	50 ml	20 ml	120 ml plastic
Field Duplicate	Total Uranium	UTA	HNO_3, pH<2 2 drops/1 drop	6 month	50 ml	20 ml	120 ml plastic

Estimated preservative volume listed are for optimum and minimum sample volumes. HNO_3 is 70 percent, 16N.
One rinsate sample shall be collected at each direct-push sampling location. The rinsate sample will be collected by rinsing the mill-slotted sampling rod.



LEGEND: — · — · — FEMP BOUNDARY ---------- PROPERTY

——— TOTAL URANIUM PLUME (ppb) ▲ RE-INJECT

— — — — APPROXIMATED TOTAL URANIUM PLUME (ppb) ● MONITORIN

☆ PROPOSED GEOPROBE LOCATION ⬟ EXTRACTIO

◉ GEOPROBE LOCATION

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FIGURE 1. DIRECT-PUSH SAMPLING LOCATIONS

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STATE PLANAR COORDINATE SYSTEM 1983

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